Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) A method for producing MR contrast agent, the method comprising the steps of:
- obtaining ~~(100)~~ a solution in a solvent of a hydrogenatable, unsaturated substrate compound and a catalyst for the hydrogenation of a substrate compound, wherein the substrate compound comprises imaging nuclei;
- hydrogenating ~~(110)~~ the substrate with hydrogen gas (H_2) enriched in para-hydrogen (p-$^1H_2$) to form a hydrogenated contrast agent; and
- prior to injection into a patient, exposing ~~(120)~~ the contrast agent to an osciallting magnetic field in combination with a stationary magnetic field for enhancing the contrasting effects of the contrast agent adapted for use in an MR application.

2. (Original) The method according to claim 1 wherein the osciallating magnetic field is oscillating with a frequency within the region of radio frequencies (e.g. from around 10 Hz to several GHz).

3. (Original) The method according to claim 1 wherien the osciallating magnetic field is osciallting with a frequency in the interval 5 kHz to 500 MHz.

4. (Original) The method according to claim 2 wherein the step of exposure to the osciallating magnetic field in combination with the stationary magnetic field is performed during the step of hydrogenation, wherein the step of exposure is performed for reducing the relaxation of the spin systems of the contrast agent, whereby the contrasting effects of the contrast agent is enhanced.

5. (Original) The method according to claim 2 wherein the step of exposure to the osciallating magnetic field in combination with the stationary magnetic field is to be

performed after the step of hydrogenation, the step of exposure is performed for enhancing the degree of polarization of an imaging nuclei of the contrast agent, whereby the contrasting effects of the contrast agent is enhanced.

6. (Original) The method according to claim 5 wherein the step of exposure to the osciallating magnetic field in combination with the stationary magnetic field comprises exposing the contrast agent to at least one series of pulses of the osciallating magnetic field (rf-pulse).

7. (Currently amended) The method according to claim 6 wherein the exposing step comprises:

- applying ~~(420)~~ a first series of pulses of the Larmor frequency of the imaging nuclei of the hydrogenated contrast agent and delays between the pulses, the first series adapted to bring the system into a state consisting of a zero quantum coherence involving the protons and the imaging nuclei;
- applying ~~(430-480)~~ a second series of pulses of the Larmor frequency of the imaging nuclei of the hydrogenated contrast agent and delays between the pulses, the second series adapted to give a progressive build up of carbon polarization in the direction of the external field axis.

8. (Currently amended) The method according to claim 6 wherein the exposing step comprises:

(a) – applying ~~(420)~~ a series of $180°_x$ pulses followed by delays (t_i) on the imaging nuclei;
(b) – applying ~~(430)~~ a $90°_y$ pulse on carbon;
(c) – waiting ~~(440)~~ for $t/2$ s;
(d) – optionally applying ~~(450)~~ simultaneous $180°_x$ pulses on hydrogen and the imaging nuclei in order to compensate for the effect of field inhomogeneities;
(e) – optionally waiting ~~(460)~~ for $t/2$ s;
(f) – applying ~~(470)~~ a pulse with an angle φ_x on the imaging nuclei;

(g) – optionally repeating steps (c) to (f) to produce a progressive build up of the imaging nuclei polarization in the direction of the external field axis, wherein the angle φ_x may be different in each repetition.

9. (Currently amended) The method according to claim 6 wherein the exposing step comprises:

- applying ~~(520)~~ a first series of pulses of the Larmor frequency of the imaging nuclei of the hydrogenated contrast agent and delays between the pulses, the first series adapted to bring the system into a state consisting of a zero quantum coherence involving the protons and the imaging nuclei;
- applying ~~(530-540)~~ a second series of pulses and delays between the pulses comprising of pulses of the Larmor frequency of the imaging nuclei of the hydrogenated contrast agent alternated with pulses of the Larmor frequency of the hydrogen of the hydrogenated contrast agent, the second series adapted to transform a two-proton-double quantum coherence into a three-spin coherence involving the spins of the imaging nuclei;
- applying ~~(570)~~ simultaneous 90°y and 90°φ pulses on the imaging nuclei and hydrogen, respectively, adapted for producing a transverse polarization of the imaging nuclei.

10. (Currently amended) The method according to claim 6 wherein the exposing step comprises:

- applying ~~(520)~~ a series of $180°_x$ pulses followed by delays t_1 on the imaging nuclei;
- applying ~~(530)~~ a $90°_y$ pulse on hydrogen;
- waiting ~~(540)~~ for $t_2/2$ s;
- optionally applying ~~(550)~~ simultaneous $180°_x$ pulses on hydrogen and the imaging nuclei in order to compensate for the effect of field inhomogeneities;
- optionally waiting ~~(560)~~ for $t_2/2$ s;
- applying ~~(570)~~ simultaneous 90°y and 90°φ pulses on the imaging nuclei and hydrogen;
- waiting ~~(580)~~ for $t_3/2$ s;
- applying ~~(585)~~ simultaneous $180°_x$ pulses on hydrogen and the imaging nuclei;
- waiting ~~(590)~~ for $t_3/2$ s;

- applying ~~(595)~~ a - $90°_y$ pulse on carbon.

11. (Previously presented) Method according to claim 7 wherein one or more of the radiofrequency pulses is either composite or modulated in amplitude, phase or frequency or any combination thereof.